METHOD OF USING A BULLET PROOF VEST

Technical Field

The present invention relates to a bullet proof vest.

Background of the Invention

Bullet proof vests have been used for a long time. However, many of such vests are heavy and uncomfortable to use. Conventional vests are often not as reliable when many shots are fired into them and the risk of injury to the wearer of the bullet proof vest increases. There is a need for a vest that protects against multiple bullets without overheating that reduces the protection. There is a need for a bullet proof vest that is comfortable and can handle a plurality of bullets without reduced protection provided by the vest. There is also a need for a vest that can easily be adjusted to the specific needs of the user so that more protection is provided in certain dangerous situations and less protection when there is less risk of being shot at with a heavy duty weapon.

Summary of the Invention

The bullet proof vest of the present invention provides a solution to the above-mentioned problems. The method of the present invention is for safely receiving a bullet in a bullet proof vest. A plate structure is provided that has an airtight enclosure enclosing high performance fiber layers, a hard layer, a textile layer having openings defined therein and a semi-solid and sticky layer such as bitumen or rubber. A bullet may penetrate through the airtight enclosure. The pressure inside the airtight enclosure is increased as a result of the energy and heat of the bullet. The increased pressure increases the volume of the enclosure and separates the layers from the hard layer and

the textile layer from the hard layer. The hard layer may be used to deform the bullet. The textile layer attaches to the bullet to follow the bullet as the bullet moves into the rubber layer. The semi-solid sticky layer sticks to the bullet as the bullet penetrates through the plate structure to further slow down the bullet. An air-bubble layer may transversely distribute the bullet impact. The vest of the present invention has convenient snap-on fasteners that make it easy to take on and take off the vest and to remove and insert the removable plates. More particularly, the vest has pockets defined therein so that the user may remove the plates and replace the plates with different plates by inserting the different plates into the pockets.

Brief Description of the Drawing

Fig. 1 is a perspective front view of the vest of the present invention;

Fig. 2 is a perspective back view of the vest of the present invention;

Fig. 3 is a detailed cross-sectional view of a portion of an armor plate of the present invention; and

Fig. 4 is a detailed cross-sectional view of a portion of an armor plate of the present invention.

Detailed Description

Figs. 1-2 show a bullet proof vest 10 of the present invention that has a front body armor section 12 with shoulder straps 14 that have snap fasteners 16 for easy take off and fastening of the vest 10. The front section 12 has an openable inside pocket 18 defined therein that extends across the entire front section 12. The pocket 18 has an armor plate 20 disposed therein to provide bullet protection for the entire front page of the body of the wearer. The section 12

has an openable outside pocket 22 defined therein for holding an additional armor plate 24.

Straps 26, 28 enclose the vest 10. The straps 26, 28 have snap fasteners 30, 32 for easy take-on and take-off of the vest. Extra side plates 34, 36 may be disposed at the lower end of the vest in pockets 35, 37 to provide extra protection for the kidney and other vital organs of the wearer. Snap-on double side plates 38, 40 may extend downwardly or hang from a lower edge 42 of the vest to protect the hip area. The plates may be attached by a snap fastener 41.

As best shown in Fig. 2, the vest 10 also has a back body armor section 44 that are attached to the shoulder straps 14 with suitable fasteners 46, 48 such a Velcro. The section 44 has an openable inside pocket 50 defined therein that extends across the entire back section 44. The pocket 50 has an armor plate 52 disposed therein so that the armor plate is removable from and insertable into the pocket 50.

The back section 44 may have a gas-mask bag 54 removably attached thereto by fasteners 56 such as Velcro so that it is easy to remove and attach the bag 54. By placing the bag 54 on the back section 44 it is not in the way when the wearer must move quickly in dangerous situations. The back section 44 also has an openable pocket 58 defined therein for holding an extra armor plate 60 so that the plate 60 may easily be removed from and inserted into the pocket 58.

Fig. 3 shows a detailed cross-sectional view of an armor plate 62 which could be identical to and used as the armor plates mentioned above. The plate 62 has an outside airtight elastic enclosure 64 that may be made of a suitable elastic polymer such as nylon that has glue on one side. A plurality of textile layers 66, disposed inside and glued to the enclosure 64, made of a high strength fiber such as aramid may be used. For example, the plate 62 could use about seven

textile layers or any other suitable number of layers. A steel or polymer layer 68 may be disposed inside the textile layers 66. Behind the layer 68 there is a polymeric net or woven layer 70 that may be a woven fiberglass or any other suitable material. A sticky and relatively soft rubber or bitumen material 72 is disposed behind the layer 70. Any suitable semisolid and sticky material may be used as the material 72. Another layer 74, similar to the layer 70, may be disposed behind the rubber material 72 followed by another sticky semi-solid material 76 similar to the material 72. Another layer 78, similar to the layers 70, 74, may be disposed behind the material 76 followed by a polymeric layer 80 that has air-bubbles 82 distributed across the layer 80. The air-bubbles not only absorb and spread the penetration and impact forces over a bigger area but also provide insulation against over heating when the vest is hit by many bullets in a short period of time. High strength fiber layers 84 such as aramid may be disposed behind the layer 80.

Fig. 4 shows an extra combination plate or trauma plate 86 that may be disposed behind the layers 84 or behind the entire plate 62 to provide extra protection and to make sure no bullet penetrates through the vest. The plate may have a plurality of high impact strength fiber textile layers 88, such as aramid, and a polymeric layer 90 with air-bubbles 92 followed by layers 94 of high strength fiber textile, such as aramid.

In operation, a bullet hits the vest 10 and penetrates through the airtight enclosure 64. The energy from the bullet generates hot gases that blow up the enclosure 64 somewhat to expand its volume and so that air gets in between the various layers of the plate 62. Because the enclosure 64 is airtight, most of the gases remain inside the enclosure 64 and increases the pressure inside and the volume of the enclosure so that there is more room for the various layers to

move relative to one another. The bullet may penetrate through the layers 66 that slow down the bullet and hits the steel layer 68. The hard layer 68 further slows down and also deforms the bullet. The layers 66 may catch any ricocheting debris and other scrap parts from the bullet as the bullet is deformed against the steel plate 68. This protects the environment and the wearer from being injured from any ricocheting debris. If the bullet has enough energy to penetrate through the plate 68, the deformed bullet encounters the woven fabric or layer 70. The woven layer 70 has holes defined therein and fibers of the layer 70 attaches to and follows the bullet as the bullet penetrates into the elastic, sticky and relatively soft rubber material 72. A portion of the material 72 sticks to the outer surface of the bullet and the fibers from the layer 70 to further slow down the velocity of the bullet. The rubber material is deformable and allows a plurality of bullets to penetrate therein without losing the effectiveness of the sticky rubber material attaching to the bullets to slow down the bullets. The fact that the bullets have been deformed by the plate 68 and the attached woven layer 70 make it easier for the rubber material to stick to the bullet. As the bullet penetrates the rubber material 72, the rubber material 72 is also heated by the heat of the bullet and the rubber material becomes stickier to further reduce the velocity of the bullet. The additional layers of the sticky rubber materials also stick to the already sticky outer surface of the bullet including the fibers from the layer 70 that are also stuck to the outer surface and rubber material on the bullet. The combination of the sticky rubber layers and the woven textile layer makes a substance that dramatically slows down the velocity of the bullet. Should the bullet penetrate through the layer 78, the air bubbles 82 of the layer 80 transversely or sideways distribute and spread out the energy and penetration forces of the bullet to further

reduce the impact of the bullet into the layers 84. The burst air bubbles 82 create a layer of air that spreads the penetration forces and thus minimizes the trauma effect since the penetration is spread out over a much large areas. In this way, the penetration forces are further weakened and the bullet is not permitted to focus the penetration energy to a small area. The layers 84 are then enclosed by the airtight enclosure 64.

An important feature of the present invention is that the various layers, except the enclosure 64, are not glued to one another to permit air to be disposed between the layers as the enclosure 64 is gas filled by the energy of the penetrating bullet.

While the present invention has been described in accordance with preferred compositions and embodiments, it is to be understood that certain substitutions and alterations may be made thereto without departing from the spirit and scope of the following claims.